TIN

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Tin has not been mined in the United States since 1993; consequently, the country is mostly reliant on imports and recycling for its tin needs. In 2004, twenty-five firms consumed 82% of the reported primary tin used domestically. The major uses were as follows: electrical solders, 25%; metal containers, 20%; transportation, 14%; construction, 11%; and other, 30%. The estimated value of primary tin metal consumed domestically was about $408 million. Industry stocks increased by about 3% compared with those at yearend 2003 (table 1).

Approximately 8,400 metric tons (t) of tin, most of it from old scrap, was recycled (table 5). About one-sixth of the tin consumed in the United States was recycled metal produced at 3 detinning plants and 80 secondary nonferrous metal processing plants. The recycling rate for steel cans was 61%, compared with 60% in 2003, 56% in 1995, and 15% in 1988 (Steel Recycling Institute, 2004).

The Defense Logistics Agency (DLA), which manages the National Defense Stockpile (NDS), sold 10,800 t of pig tin from the stockpile during 2004. World primary tin mine output remained almost the same as in 2003 (tables 1, 9). Industry observers thought that the world tin market in 2003 was in a moderate supply deficit status. World primary tin smelter production increased by about 11%. The composite tin price rose by 64%, following the pattern of many other metals. The substantial price rise was attributed to exceptional demand from China, which now is the world's leading consumer and miner/smelter of tin. Of the 21 countries in which tin was mined, the top 6 accounted for 96% of the world total of 262,000 t. China was the leading producer (42% of world output) and was followed by Indonesia (25%), Peru (16%), Bolivia (6%), Brazil (5%), and Vietnam (2%). World tin reserves were estimated to be 6.1 million metric tons (Mt). Assuming that world primary tin consumption will be about 200,000 metric tons per year (t/yr), these reserves would last 40 years. Most tin reserves are in Asia and South America.

Legislation and Government Programs

In 2004, the DLA sold 10,800 t of pig tin under the basic ordering agreement (BOA) and the long-term negotiated contract formats. The effect of proposed NDS sales on domestic markets is assessed by the Market Impact Committee comprising several Federal agencies, including the U.S. Geological Survey (USGS).

The DLA Annual Materials Plan proposed disposal for tin is 12,000 t per fiscal year. The quantity represents the maximum amount that can be sold in a fiscal year. Under the BOA approach, the Defense National Stockpile Center (DNSC) posts the amount of tin that it wants to sell on its Web site every Tuesday. Interested companies submit a bid and DNSC makes a sales determination by the end of the business day. BOA sales began in June 2002. The NDS tin is stored at Federal depots at three locations: Hammond, IN; New Haven, IN; and Point Pleasant, WV.

Production

Mine.—Tin was not produced at any domestic mine in 2004. Until 1993, a few small tin mines had operated sporadically in the United States. However, USGS canvasses confirm that there has been no primary domestic tin production since that year.

Secondary.—Industry observers thought that the United States is the world's leading producer of secondary tin. Most secondary tin has been produced in the United States from various scrapped alloys of tin and recycled in those same alloy industries. Secondary tin from recycled fabricated parts has been used in many kinds of products and is a particularly important source of tin for the manufacture of solder and brass/bronze.

The Steel Recycling Institute, funded by the domestic steel industry, continues to promote the collection, preparation, and transportation of steel can scrap. The domestic recycling rate for steel cans, most of which are made from tinplate, was 61% in 2004, up slightly from 60% in 2003 (Steel Recycling Institute, 2004).

Consumption

In 2004, consumption of primary tin increased by 1% (tables 1, 2). Domestic consumption data for tin were developed by the USGS from a voluntary survey of tin consumers. Of the 127 firms to which a survey form was sent, 112 responded, including the major consumers.

The total number of metal cans shipped was 134 billion in 2004, slightly below that of 2003. The Can Manufacturer's Institute no longer provides a categorization by types of can (for example, aluminum versus steel). Steel (essentially tinplate and tin-free steel) dominated in the food, pet, and the "general line" can markets, and aluminum held 100% of the beverage can market (Can Manufacturer's Institute, 2004).

The consolidation of the domestic steel industry continued. International Steel Group Inc. (ISG) (Cleveland, OH) purchased the assets of bankrupt Weirton Steel Corp. (Weirton, WV) for $255 million in cash and the assumption of liabilities. Weirton was the

fifth-ranked integrated steel producer in the United States, and was the second ranked producer of tin mill products behind U.S. Steel Corp. Shipments of tin mill products accounted for about 40% of Weirton's revenues in 2003. The deal meant that ISG, which started by assuming the assets of the former LTV Steel Corp. out of bankruptcy, spent more than $2.1 billion to purchase the assets of LTV Corp. ($327 million), Acme Steel Co. ($65 million), Bethlehem Steel Corp. ($1.5 billion), and Weirton Steel Corp. ($255 million) in approximately the past 2 years. With the addition of Weirton's approximately 3 Mt of total steel production capacity, ISG has upwards of 23 Mt of total capacity, making it the second-ranked integrated steel producer in the United States behind U.S. Steel Corp. (Metal Bulletin, 2004f).

Price

The Platts Metals Week average composite price for tin metal rose by 64% in 2004 compared with that of 2003. The Platts Metals Week average composite tin price was $4.33 per pound in January and rose fairly steadily through May reaching $5.92 per pound; for the balance of the year the price drifted downward, reaching $5.55 per pound in December; the strong price pattern for tin paralleled similar gains for many other metals. Industry analysts attributed the remarkable price increases to greater demand from China at a time of continuing moderate world tin supply deficits.

The London Metal Exchange (LME) remained the primary trading arena for tin. Tin is one of only six metals traded on the LME. The other metals are aluminum, copper, lead, nickel, and zinc.

Trade

U.S. imports of refined tin, which supplied most domestic tin requirements, surged by 28% compared with those of 2003. Imports of tin in all forms (metal, ore and concentrate, scrap, and waste) remained duty free (tables 7, 8). Most of the tin was imported from a variety of countries and was held in U.S. warehouses by trading firms until sold to customers. Foreign-owned trading firms tended to dominate the marketing of imports. U.S. imports of refined tin came mostly from Peru, Malaysia, China, Bolivia, Indonesia, and Brazil, in descending order. Refined tin exports were small compared with imports (table 6).

World Review

Speakers at the Metal Events International Tin Conference in Cologne, Germany, held in the spring struck a decidedly bullish note. Among some of the points: a) the global tin market has moved away from the recent 20-year crisis period of low tin prices and is now moving into territory last seen before the great "tin crash" of 1985. b) tin's "intensity of use" is rising for the first time in decades; solder use in the Western World may increase to 90,000 t in 2004. c) there has been very little investment in tin mines in the past 10 to 20 years, and small mines accounted for 45% to 50% of world production in 2003. d) supply is likely to remain tight for the next few years unless new mines are developed, or existing smelters upgraded. e) the U.S. Government stockpile will be exhausted during the next few years, in effect removing a large "producer" from the market (Platts Metals Week, 2004h).

Europe continued to be a larger market for tin than the United States. In the critical tin can field, one of the dominant end-use sectors in Europe is the pet food can, where pouches (a nontinned product) are making inroads into the canned pet food market. Canned pet food is still dominant in the United Kingdom (UK), with a 70% market share. For the rest of Europe, canned pet food controls 80% of the market (Canmaker, 2004).

Australia.—Bluestone Nominees Pty. Ltd. announced that it expected dewatering at its recently acquired Renison Bell Tin Mine to be completed by midyear. The firm expected operations to begin by late 2004, and anticipated initial production of tin-in-concentrate to be 5,000 t/yr. With its existing Collingwood (Queensland) deposit, which has an expected 3,000-t/yr capacity, Bluestone felt total production is expected to be nearly 10,000 t/yr by yearend 2005 (Platts Metals Week, 2004b). Bluestone Tin agreed to buy another tin project in Tasmania to complement the Renison Bell Tin Mine.

Bluestone agreed to purchase the closed Mount Bischoff Tin Mine at Waratah, northwest Tasmania, from a private vendor. The Mount Bischoff Mine, located 80 kilometers (km) north of Renison Bell, last operated in 1921, produced 5.5 Mt of tin ore containing about 1% tin during its operating life. Bluestone planned to reestablish the mine immediately and to begin open pit mining within a year (Metal Bulletin, 2004b).

Malaysia Smelting Corp. (MSC) (Penang, Malaysia) announced that it won the rights to treat tin concentrates from Bluestone's Renison Bell Tin Mine. MSC superceded Thaisarco (Thailand), which had previously treated Renison tin concentrates under a long-term contract with previous owner Murchison United NL (CRU Week in the News, 2004a§[1]).

Malachite Resources NL announced that recent fieldwork on its wholly owned Elsmore exploration project, located 20 km east of Inverell in northern New South Wales, produced very encouraging results. Good grade mineralization was discovered in a wide area at Sheep Station Hill, and the tin was accompanied by higher than expected values of copper, molybdenum, and silver. The average tin grade of the 66 samples assayed of outcropping greisens from Sheep Station Hill was 0.2% tin. Malachite officials thought that tin grades would improve with depth (TIN World, 2004a).

The administrator of the bankrupt Ardlethan Tin Mine in New South Wales proceeded with the facility's dismemberment by auctioning off all the mine's plant and equipment. The only remaining assets were the land, water rights, and mining rights, which will be sold soon (Metal Bulletin, 2004a).

[1]References that include a section mark (§) are found in the Internet References Cited section.

Marlborough Resources NL, the country's leading tin miner, produced just about 193,000 kilograms (kg) of tin in the first quarter of 2004, down sharply from the 314,000 kg produced in the fourth quarter of 2003. The company blamed the decline on poor ore grade (Metal Bulletin, 2004g).

Van Dieman Mines (Sydney, New South Wales) announced that it expected to be producing from its Tasmanian operations by yearend 2005. Initial tin output was expected to be 1,700 t/yr of tin-in-concentrate, eventually rising to 2,000 t/yr. The firm expected tin to account for 60% of its revenues (CRU Tin Monitor, 2004b).

The Sons of Gwalia (SOG) organization and its administrators announced an investment plan which involved the restart of underground mining by mid-2006 at the Greenbushes tantalum/tin mine in Western Australia. SOG also announced a new 3-year tantalum offtake agreement with HC Starck Co. Recent tin production from open pit operations at about 500 to 600 t/yr was expected to be increased by the expansion (CRU Tin Monitor, 2004b).

Bolivia.—At the San Bartholome project, owned by Coeur d'Alene Mines Corp. (USA), work continued on the final updated feasibility studies. Gold and silver are the primary initial interest. The addition of a tin circuit would allow for the recovery of tin as a significant byproduct. Based on current reserves, the firm estimates that annual mine production could be as high as 900 t/yr of tin content with 13,600 t of total tin recovery during the life of the mine. The company thought the project could commence in late 2004, with gold and silver production to start in 2006 (TIN World, 2004b).

Brazil.—The country's leading tin miner, Paranapanema Group SA, spent $40 million to boost future tin output at the Rocha Sa project in the Pitinga region, but it expected to produce only 7,600 t of tin in 2004, just below the 8,000 t produced in 2003. About 66% of this total would be exported. Of the 7,600 t of tin Paranapanema was expected to extract from Pitinga in 2004, 33% was projected to come from the Rocha Sa project (a deposit in which granite is the host rock) and 67% would come from the rapidly depleting adjacent alluvial deposits, the same percentages as in 2003. By the end of 2006, the company expected it would get all its tin, about 9,700 t, from Rocha Sa and none from the exhausted alluvial deposits at Pitinga (Platts Metals Week, 2004f).

China.—An official from China's National Nonferrous Metal Import and Export Corp. (Minmetals) noted early in the year that even though tin prices were strong, China's tin metal output would not increase much in 2004 because feed sources were limited. China produced 98,000 t of refined tin metal in 2003, including tin ingot, tin alloy ingot, and other tin products. Of China's actual 115,000 t of tin production in 2004, about 80% to 90% was thought to be tin ingot (Platts Metals Week, 2004g).

Yunnan Tin Corp., China's leading tin producer, reported refined tin production of 31,100 t in 2003, an increase of 8% more than that of 2002. Solders, tin chemicals, and other tin products accounted for some 30% of total sales. The company also produced bismuth, copper, lead, and silver (CRU Tin Monitor, 2004b).

The major Chinese producers of refined tin, in descending order of production were:

- Yunnan Tin Industry Co. Ltd. (Yunnan Province).
- Liuzhou China Tin Group Co. Ltd. (Guangxi Province).
- Gejin Zili Smelter (Yunnan Province).
- Yunnan Chengfong Nonferrous Metals Co. Ltd. (Yunnan Province).
- Zhongshan County Jinyi Smelting Co. Ltd. (Guangxi Province).
- Mongzi Bofa Mine-Smelting Co. Ltd. (Inner Mongolia).
- Pinggui PGMA Co. Ltd. (Guangxi Province).
- Hezhou County Fuli Fengfan Smelter (Guangxi Province).
- Minmetals Ganzhou Tin Industry Co. Ltd. (Guangxi Province).

(Beijing Antaike Information Development Co. Ltd., 2004).

State-owned metals-trading firm China Minmetals Corp. announced plans to acquire China's second leading tin producer, Liuzhou China Tin Group Co. The transaction would give China Minmetals control over the mineral-rich Nandan region in southwestern China. One official observed that Minmetals was no longer a pure trading company. Recently, Minmetals acquired mining reserves that were protected by the Government, including antimony, tin, and tungsten. Liuzhou China Tin's main producing asset is the Gaofeng Tin deposit in Nandan. The firm owns several other suspended operations in the region (Mining Journal, 2004).

Liuzhou China Tin Group produced 12,800 t of refined tin in 2004, about 15% lower than its 2003 output. The decline was attributed to ore shortages, with the company mining just 6,500 t of low-grade ore in the Nandan area of southwest China. The firm was owned by the Guangxi Province Government (CRU Week in the News, 2005a§).

The Guangzhou Tin Smelter ended its refined tin production owing to State environmental polices that restricted smelting in the Guangzhou region. The smelter had a 4,000 t/yr tin metal production capacity and had been shut since early 2003 owing to insufficient ore supply (Platts Metals Week, 2004d).

Baoshan Iron & Steel Co. Ltd. announced that Chinese tinplate demand was expected to almost double by 2012 to 3 Mt from 1.7 Mt in 2003. Baoshan aimed to retain its 30% share of the domestic tinplate market by expanding its capacity in parallel with this growing demand. Baoshan operated at its tinplate production capacity of 550,000 t/yr. The company ordered a new tin-free steel (TFS) line, which was expected to be completed by 2007. China currently has no TFS production (Metal Bulletin, 2004d).

The Chinese Government announced that it would cut its tin export quotas for 2005 by 5%. Tin and tin products, which included alloys, forgings, and tin metal, were given export quotas of 57,000 t for 2005. The cut in export quotas stemmed from greater demand for the materials in the domestic market (Metal Bulletin, 2004c).

Germany.—Rasselstein Hoesch GmbH, a major tinplate producer, announced that henceforth it would be known as Rasselstein GmbH. The company was formed in 1995 by the merger of Rasselstein AG (Neuwied, Germany) and Krupp Hoesch Stahl AG (Dortmund, Germany). At that time, the Dortmund tinplate facility was closed and the main tinplate facility Andernach was enhanced (TIN World, 2004d).

Statistics indicate that the market for steel packaging (most of which is tinplate) shrank by 16% in 2003, to about 600,000 t of material, mainly because of the mandatory deposit system on beverage cans. The necessity to return empty containers for refunds was not popular with consumers. Germany's other packaging segments remain stable, with food accounting for 30% of the tinplate market, chemical products such as paints and lacquers 16%, closures 16%, pet food 12%, and aerosols 8% (Metal Bulletin 2004e).

India.—Production of tinplate was expected to expand during the next few years as the nation's two tinplate manufacturers attempted to increase output to supply the domestic canmaking industry. Although consumption of canned goods had remained stable for a number of years, India still imported about 35% of its tinplate requirements, presenting the tinplate producers with an opportunity to increase their domestic sales. The Tinplate Company of India Ltd. (TCIL) had the larger output of India's two tinplate producers, even though the company's installed tinplate production capacity was less than that of its competitor. Established in 1928, TCIL's tin mill is located near Calcutta in West Bengal and is now part of the diversified Tata business group. TCIL had the capacity to produce about 100,000 t/yr of tinplate and was thought to produce close to that amount. The tinplating line of the State-run Steel Authority of India Ltd., the other tinplate maker, at its Rourkela works in eastern Orissa State had the capacity to produce 150,000 t/yr of tinplate, but owing to black plate supply problems, was only able to produce about 80,000 t/yr of tinplate.

Indonesia.—Operations at the country's major tin mines and smelters mostly located along coastlines, were not affected by the powerful earthquake near North Sumatra on December 6, 2004, and the devastating Tsunami it unleashed on several coastal regions in southern and southeastern Asia (Platts Metals Week, 2005).

Iran.—Farokhshahr Steel Industry Co. (FSI), a newcomer to the Iranian steel sector, was scheduled to start up Iran's third electrolytic tinning line in 2005. This would be a new plant with a capacity of 150,000 t/yr of tinplate in widths of 820 to 1,100 millimeters (mm) and thicknesses of 0.15 mm to 0.5 mm. The plant is in Shahr-e-kord in Chaharmahalva–Bahktiyarp Province, about 500 km south of Tehran. The total project cost, including a shearing line, was estimated to be about $35 million. This would be the first privately owned tinning line in Iran (Metal Bulletin Daily, 2004a).

Japan.—The country has set the international pace in developing and adopting lead-free solder since the late 1990s. While companies in Europe and the United States continue efforts to introduce lead-free solder, the proportion of lead-free solder used in Japan continued to exceed that of all other countries. Estimates suggest that 60% of all solder used by Japanese firms in 2004 was lead free. Senju Metal Industry Co. Ltd., one of Japan's leading solder makers, announced that it had recorded an overall increase of about 20% in solder sales compared with those of 2003. Senju attributed this to increases in demand for cellular telephones, LCD screens, plasma TVs, and semiconductors. In Japan, the most popular lead-free solder has a composition of 96.5% tin, 3% silver, and 0.5% copper (TIN World, 2004f).

Hitachi Ltd. was the latest Japanese consumer electronics maker to cease using lead-base solder ahead of environmental regulations. Scheduled to be implemented in the European Union (EU) by 2006, the regulations will ban the use of toxic materials. Company officials noted that by adding indium to the commonly used tin-silver-copper solder, they achieved satisfactory reliability and workability. Hitachi was to cease using lead-base solders at all of its overseas plants and in procured parts by March 2005. Japan's Matsushita Electric Industrial Co., Mitsui Chemical Inc., and Casio Computer Co. had stopped using lead-base solder by July 2002 (Platts Metals Week, 2004e).

Malaysia.—During the past 3 years, Malaysia Smelting Corp. (MSC), Penang, Malaysia, made two major acquisitions outside of Malaysia, buying a 75% stake in PT Koba Tin (Indonesia) in 2001 and a 30% share in Marlborough Resources (Australia) in 2003 as part of a proactive upstream integration business strategy. MSC was one of several tin smelters that had decreased tin ingot production because of the shrinking world market for tin concentrates. One of the main reasons for the shrinkage had been the expansion of tin refining capacity in Peru and the resulting drop in Peruvian tin concentrate exports, which used to account for 20% of MSC's supplies. Other reasons included the decline of the Renison Mine in Australia and Indonesia's ban on tin concentrate exports announced in June 2002 to protect the domestic industry. Incorporated in 1982 to absorb the Straits Trading Company Ltd.'s tin smelting business, MSC was listed on the main board of the Kuala Lumpur Stock Exchange in 1994. Employing about 500 staff, MCS's smelter was located on a 12-acre seashore site in Butterworth, Penang State, Malaysia, where tin smelting has been conducted since 1902. MSC managed a medium-grade smelter with five blast furnaces, of which two were in operation at the same time. The smelter has the capacity to produce 27,000 t/yr of tin ingots. Concentrate accounted for 90% of MSC's materials supply. The rest was secondary recycled materials from the chemical, electronics, and tinplate industries (TIN World, 2004c).

MSC signed an agreement with the liquidator of bankrupt tin miner Rayman Hydraulic Tin (RHT) to purchase its issued and paid-up share capital for $6 million. RHT's mining area covers a large region of Klian Intan, Perak, in West Malaysia. The mining activity currently produces about 80 metric tons per month (t/mo) of tin-in-concentrates. All concentrates produced by RHT were transported to MCS' smelter in Butterworth for smelting (Metal Bulletin Daily, 2004b).

MSC announced that it had established a new Indonesian subsidiary (PT MSC Indonesia) to undertake exploration and mining on Bangka Island with a private firm, PT Mitra Stania Prima. Indonesia-based PT Koba Tin, a 75%-25% joint venture with State-controlled producer PT Timah, produced 18,800 t of refined tin in 2004, while MSC's Butterworth tin smelter in Malaysia produced 18,200 t (CRU Tin Monitor, 2004b).

MSC announced that it won the rights to treat tin concentrates from Bluestone's Renison Bell Tin Mine in Tasmania, Australia. MSC superceded Thaisarco (Thailand), which had previously treated Renison tin concentrates under a long-term contract with previous owner Murchison United (CRU Week in the News, 2004§).

Netherlands.—Ispat International NV (Rotterdam) announced plans to acquire International Steel Group (ISG) (Cleveland, Ohio). The resulting newly named Mittal Steel Co. would then become the world's leading steel producer. Both firms were important tinplate producers. Industry analysts have long thought that the world's steel industry needs to be "rationalized," made smaller through mergers that took place during the past 10 years, but only on a "continental" basis (that is, within Europe, Japan, and the United States). ISG is currently the leading steel producer, and tinplate producer, in the United States. Ispat has large steel holdings

on several continents, including the former Inland Steel Corp., based in E. Chicago, IN. This merger would be a truly global one (American Metal Market, 2004).

Peru.—Minsur SA increased its tin mine production by about 3% to a new record level of 41,000 t of tin-in-concentrate in 2004, and its output of refined tin metal rose by about 3% to 40,000 t, also a record. The Peruvian company was on track to overtake Indonesia's PT Timah to become the world's leading tin miner, depending on Timah's yet-to-be-released fourth quarter results. Minsur's production was expected to decline marginally in 2005, as ore grades at its San Rafael mine decline (CRU Week in the News, 2005a§).

Portugal.—Rio Tinto plc (United Kingdom) and the Portugese State holding company, Empresa de Desenvolvimento Mineiro, agreed to sell their interests (49% and 51% respectively) in the Neves Corvo Mine in Portugal to EuroZinc for 128 million euros ($156 million). The mine was expected to produce 90,000 t of copper and 300 t of tin-in-concentrate in 2004 (CRU Tin Monitor, 2004a).

Russia.—The Novosibirsk Tin Combine planned to double refined tin production to 8,000 t/yr during the next 5 years. The Dalolovo and Vostokolovo tin mines planned to boost tin concentrate production by about 90% to 1,500 t in 2004 (CRU Tin Monitor, 2004a).

Crown Food Europe, an affiliate of Philadelphia, PA-based Crown Holdings Corp., a major canmaker, announced that it was installing a new can production line in Timashevsk, Russia, to produce 83-millimeter-diameter tinplated steel food cans for Bonduelle, a European leader in sales of processed vegetables. Cans were to be supplied to the new Bonduelle plant near Krasnodar, located 70 km from Timashevsk. The tinplate was to be secured from Crown Hellas in Greece (Platts Metals Week, 2004c).

Spain.—Goldtech Mining Corp. acquired a 12,500-acre mining property from Solid Resources Ltd. that formerly produced lithium, niobium, tantalum, and tin. Goldtech has committed to a $600,000 drilling program. The property, known as the "Golpejas Property," is located near Salamanca, Spain, and has hydroelectric power and paved road access. Before its closure in the early 1970s, the Goldpejas Mine produced approximately 5 Mt of lithium, niobium, tantalum, and tin. According to Goldtech, the Spanish Institute of Mines has identified more than 3.5 Mt of resources remaining at the site (TIN World, 2004e).

Thailand.—Thai Tinplate Manufacturing Co. Ltd. (TTP) announced plans to spend $42 million during the next 2 years to add 150,000 t/yr to its capacity in order to capitalize on strong demand. TTP operated three tinning lines at its plant in Samutprakarn, south of Bangkok, and was to begin installing a fourth line to increase the plant's total capacity to 510,000 t/yr, thus making it one of Asia's leading tinplate producers (Metal Bulletin, 2004h).

United Kingdom.—Baseresult Holding Ltd., which purchased the South Crofty Tin Mine (UK) in 2001, announced that it may resume tin production within 2 years. South Crofty, the UK's last operating tin mine, ceased production because of low tin prices in 1998. South Crofty is located in Cornwall, an historic tin mining area in southwestern England. Baseresult thought that production costs at South Crofty could be cut by about 30% while maintaining preclosure tin production levels of 2,000 t/yr (Platts Metals Week, 2004a).

Current Research and Technology

As a result of the EU's End-of–Life Directive aimed at replacing toxic lead and antimony components currently used in brake pads, several firms have been working to find an environmentally acceptable substitute for antimony trisulfide or lead sulfide for friction stabilization in brake pads. Tin Technology Ltd. (United Kingdom) has developed a tin-base brake pad in collaboration with PBW Metal Products Ltd. (United Kingdom). The new brake pads have been named "Tibrake" (Metal-Pages, 2004§).

Brush Wellman Corp. (Cleveland, OH) announced the development of a copper-nickel-tin alloy that is said to provide lubricity and corrosion resistance in high-load bearing applications. Called "Tough Met," the alloy has been used in bearings for applications such as aircraft, mining equipment, and race cars. Two variations of the alloy contain 6% and 8% tin (Advanced Materials & Processes, 2004).

Outlook

Domestic demand for primary tin is expected to increase slowly in the next few years, at a rate of about 1% per year. That rate, however, will probably double in a few years if new applications—especially those in which tin is substituted for toxic materials, such as lead-free solders—find acceptance in the marketplace.

World tin reserves appear to be adequate to meet foreseeable demand. Secondary sources of tin are likely to remain an important component of supply, especially in the United States. NDS sales are expected to continue for a few more years and remain an important segment of domestic supply until the inventory is exhausted. Domestic tin requirements will probably continue to be met primarily through imports.

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TABLE 1
SALIENT TIN STATISTICS[1]

		2000	2001	2002	2003	2004
United States:						
Production, secondary, contained tin[e]	metric tons	15,700	13,900	10,500	7,960 [r]	8,970
Exports, refined tin	do.	6,640	4,350	2,940	3,690	3,650
Imports for consumption, refined tin	do.	44,900	37,500	42,200	37,100	47,600
Consumption, contained tin:						
Primary	do.	38,100	34,200	34,000	32,900	33,300
Secondary	do.	8,940	7,630	5,830	4,510 [r]	5,670
Stocks, yearend, U.S. industry, contained tin	do.	10,400	9,620	8,910	7,960 [r]	8,170
Prices, average, contained tin:						
New York, NY market	cents per pound	254.92	211.48	194.75	232.36	409.37
Platts Metals Week composite	do.	370.16	314.88	291.97	339.78	547.30
London, United Kingdom	do.	246.00	203.00	184.00	222.00	385.00
Kuala Lumpur, Malaysia	do.	244.12	200.77	184.35	221.67	385.11
World, production, contained tin:						
Mine	metric tons	278,000 [r]	249,000 [r]	238,000 [r]	263,000 [r]	262,000 [e]
Smelter:						
Primary	do.	272,000 [r]	172,000 [r]	265,000 [r]	268,000 [r]	298,000 [e]
Secondary	do.	16,600	16,200	14,200	11,900 [r]	11,300 [e]
Undifferentiated	do.	--	--	25 [r, e]	70 [r, e]	71 [e]

[e]Estimated. [r]Revised. -- Zero.

[1]Data are rounded to no more than three significant digits, except prices.

TABLE 2
U.S. CONSUMPTION OF PRIMARY AND SECONDARY TIN[1]

(Metric tons, contained tin)

	2003	2004
Stocks, January 1[2]	8,220 r	7,310
Net receipts during year:		
Primary	32,400 r	37,200
Secondary	1,380 r	1,840
Scrap	3,440 r	4,350
Total receipts	37,300 r	43,400
Total available	45,500 r	50,700
Tin consumed in manufactured products:		
Primary	32,900	33,300
Secondary	4,510 r	5,670
Total	37,400	39,000
Intercompany transactions in scrap	343 r	496
Total processed	37,700 r	39,500
Stocks, December 31 (total available less total processed)	7,770 r	11,300

rRevised.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes tin in transit in the United States.

TABLE 3
U.S. CONSUMPTION OF TIN, BY FINISHED PRODUCT[1]

(Metric tons, contained tin)

Product	2003			2004		
	Primary	Secondary	Total	Primary	Secondary	Total
Alloys, miscellaneous[2]	W	W	W	W	W	W
Babbitt	2,570	W	2,570	724	W	724
Bar tin	852 r	W	852 r	680	W	680
Bronze and brass	1,260	1,340	2,600	1,230	1,840	3,070
Chemicals	8,720	W	8,720	9,120	W	9,120
Collapsible tubes and foil	W	W	W	W	W	W
Solder	7,660	2,950	10,600	9,730	3,580	13,300
Tinning	833	--	833	798	--	798
Tinplate[3]	7,790	--	7,790	7,700	--	7,700
Tin powder	W	W	W	W	W	W
Type metal	W	W	W	W	W	W
White metal[4]	1,220	W	1,220	937	W	937
Other	1,960 r	217 r	2,180	2,370	254	2,630
Total	32,900	4,510 r	37,400	33,300	5,670	39,000

r Revised. W Withheld to avoid disclosing company proprietary data; included with "Other." -- Zero.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes terne metal.
[3]Includes secondary pig tin and tin acquired in chemicals.
[4]Includes pewter, britannia metal, and jewelers' metal.

TABLE 4
U.S. INDUSTRY YEAREND TIN STOCKS[1]

(Metric tons)

	2003	2004
Plant raw materials:		
Pig tin:		
Virgin[2]	5,960 r	6,040
Secondary	370 r	408
In process[3]	955 r	892
Total	7,290 r	7,340
Additional pig tin:		
Jobbers-importers	382	762
Afloat to United States	290 r	62
Total	672 r	824
Grand total	7,960 r	8,170

rRevised.
[1]Data are rounded to no more than three significant digits; may not add to totals shown.
[2]Includes tin in transit in the United States.
[3]Data represent scrap only, tin content.

TABLE 5

U.S. STOCKS, RECEIPTS, AND CONSUMPTION OF NEW AND OLD SCRAP AND TIN RECOVERED, BY TYPE OF SCRAP[1]

(Metric tons)

	Gross weight of scrap								
	Stocks,		Consumption			Stocks,	Tin recovered[e]		
Type of scrap	January 1	Receipts	New	Old	Total	December 31	New	Old	Total
2003:									
Copper-base scrap:									
Ingot makers	5,700	70,200 r	17,600 r	53,100 r	70,700 r	5,170 r	689 r	2,110 r	2,800 r
Brass mills[2]	--	28,400	28,400	--	28,400	--	487	--	487
Foundries and other plants	2,290	28,000 r	16,900	11,500 r	28,300 r	1,940 r	W	406 r	406 r
Total	XX	XX	XX	XX	XX	XX	1,180 r	2,520 r	3,690 r
Lead-base scrap	26,700 r	1,170,000 r	W	1,150,000	1,150,000 r	21,100 r	W	2,980	2,980 r
Tin-base scrap[3]	W	W	W	W	W	W	2,390 r	W	2,390 r
Grand total	XX	XX	XX	XX	XX	XX	3,570 r	5,500 r	9,070 r
2004:									
Copper-base scrap:									
Ingot makers	5,170	71,500	17,900	53,600	71,400	5,200	712	2,100	2,810
Brass mills[2]	--	22,800	22,800	--	22,800	--	469	--	469
Foundries and other plants	1,940	27,600	17,300	10,800	28,100	1,420	W	397	397
Total	XX	XX	XX	XX	XX	XX	1,180	2,490	3,670
Lead-base scrap	21,100	1,150,000	W	1,130,000	1,130,000	23,900	W	2,350	2,350
Tin-base scrap[3]	W	W	W	W	W	W	2,410	W	2,410
Grand total	XX	XX	XX	XX	XX	XX	3,590	4,850	8,440

[e]Estimated. [r]Revised. W Withheld to avoid disclosing company proprietary data. XX Not applicable. -- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

[2]Consumption is assumed to be equal to receipts.

[3]Includes tinplate and other scrap recovered at detinning plants.

TABLE 6
U.S. EXPORTS OF TIN IN VARIOUS FORMS[1]

	Tinplate and terneplate		Ingots and pigs		Tin scrap and other tin-bearing material except tinplate scrap[2]	
Year	Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)
2003	263,000	$154,000	3,690	$18,500	24,500	$32,600
2004	262,000	169,000	3,650	25,700	16,800	42,900

[1]Data are rounded to no more than three significant digits.
[2]Includes rods, profiles, flakes, tubes, and pipes.

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF TIN IN VARIOUS FORMS[1]

		Dross, skimmings, scrap residues, tin alloys, n.s.p.f.[2]		Tinplate and terneplate		Tin compounds		Tinplate scrap	
Year	Miscellaneous,[3] value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)
2003	$3,510	3,290	$10,500	282,000	$173,000	443	$3,000	20,100	$3,390
2004	7,080	5,790	24,500	328,000	215,000	635	6,030	9,650	2,020

[1]Data are rounded to no more than three significant digits.
[2]Not specifically provided for.
[3]Includes tinfoil, tin powder, flitters, metallics, manufactures, and n.s.p.f.

Source: U.S. Census Bureau.

TABLE 8
U.S. IMPORTS FOR CONSUMPTION OF UNWROUGHT TIN METAL,
BY COUNTRY[1]

	2003		2004	
Country	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Australia	200	$876	121	$963
Belgium	87	585	70	740
Bolivia	5,720	26,700	5,060	38,200
Brazil	3,000	12,800	4,330	33,600
Canada	5	27	58	480
Chile	636	3,160	281	1,950
China	4,340	19,600	5,310	44,800
Indonesia	3,070	10,200	4,660	37,300
Japan	136	646	540	4,320
Malaysia	490	2,200	6,600	56,900
Netherlands	40	168	--	--
Peru	19,100	90,900	19,600	163,000
Taiwan	34	527	21	419
Thailand	--	--	500	4,510
United Kingdom	143	528	97	481
Vietnam	59	294	--	--
Other	1	26	380	2,680
Total	37,100	169,000	47,600	390,000

-- Zero.

[1]Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 9

TIN: WORLD MINE PRODUCTION, BY COUNTRY[1, 2]

(Metric tons)

Country	2000	2001	2002	2003	2004[e]
Australia	9,146	9,602	6,268	3,819 [r]	800 [3]
Bolivia	12,464	12,352 [r]	15,242	16,755 [r]	16,800
Brazil	14,200 [r]	13,016 [r]	12,063 [r]	12,217 [r]	12,200
Burma[4]	212	212	450 [r]	607 [r, e]	700
Burundi	8 [r]	4	--	7 [r]	10
China[e]	99,400	95,000	62,000	102,000 [r]	110,000
Congo (Kinshasa)[e]	50	50	20	40	80
Indonesia	51,629	61,862	88,142	71,694 [r]	65,772 [3]
Kyrgyzstan[e]	300	300	300	-- [r]	--
Laos	408	490	366	360 [e]	340
Malaysia	6,307	4,972	4,215	3,359	3,000 [3]
Mexico	4	8	9	21 [r, e]	24
Niger	22	9 [e]	11	11 [r, e]	11
Nigeria[e, 5]	2,760	2,870	2,800 [3]	3,700 [r]	3,000
Peru	70,901	69,696 [r]	38,815	40,202 [r]	41,613 [3]
Portugal	1,227 [r]	1,174 [r]	361 [r]	200 [r, e]	500
Russia[e]	2,500	2,000	1,300	2,000	2,500
Rwanda	276	169	197	192 [r, e]	300
Spain[e]	3	2	2	2	2
Thailand	1,930	1,950	1,130	817	567 [3]
Uganda	[6]	18	--	1 [r]	1
Vietnam[e]	4,100	4,500	4,500 [3]	4,600	4,000
Total	278,000 [r]	249,000 [r]	238,000 [r]	263,000 [r]	262,000

[e]Estimated. [r]Revised. -- Zero.

[1]World totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Table includes data available through July 18, 2005.

[3]Reported figure.

[4]Includes content of tin-tungsten concentrate.

[5]Concentrate gross weight reported, estimated 62% tin content.

[6]Less than ½ unit.

TABLE 10
TIN: WORLD SMELTER PRODUCTION, BY COUNTRY[1, 2]

(Metric tons)

Country	2000	2001	2002	2003	2004[e]
Australia:					
Primary	775	1,171	791 [r]	597 [r]	478 [3]
Secondary[e]	300	300	300	300	300
Total[e]	1,075	1,471	1,091 [r]	897 [r]	778
Belgium, secondary[e]	8,500	8,000	6,000	5,000	5,000
Bolivia, primary	9,353	11,292	10,976	10,976 [r, p]	11,000
Brazil:					
Primary	13,825	12,168 [r]	11,675	10,761 [r]	11,000
Secondary[e]	250	250	250	250	250
Total[e]	14,100	12,400 [r]	11,900	11,000 [r]	11,300
Bulgaria, secondary[e]	10	10	10	10	10
Burma, primary[e]	30	30	30	30	30
China, primary[e]	112,000	105,000	82,000	98,000 [r]	115,000
Czech Republic, secondary[e]	100	100	100	100	100
Denmark, secondary[e]	100	100	100	100	100
Greece, secondary[e]	150	150	150	100	100
Indonesia, primary	46,432	53,470	67,455	65,000 [e]	65,000
Japan, primary	593	668	659	662	707 [4]
Malaysia, primary	26,228	30,417	30,887	18,250 [r]	30,000
Mexico, primary	1,204	1,789	1,748 [r]	1,769 [r]	1,775 [4]
Nigeria, primary[e]	25	25	26	25	25
Norway, secondary[e]	50	50	50	50	50
Peru, primary	37,410	27,683 [r]	35,828	39,181	40,624 [4]
Russia:[e]					
Primary	4,800	4,569 [4]	4,615 [4]	5,500	5,500
Secondary	500	500	500	500	500
Total	5,300	5,070	5,120	6,000	6,000
Rwanda	--	--	25 [r, e]	70 [r, e]	71 [4]
Spain, secondary[e]	25	25	25	25	25
Thailand, primary	17,076	22,387	17,548	15,763 [r]	15,500
United States, secondary	6,600	6,700	6,760	5,500 [r]	4,850 [4]
Vietnam, primary[e]	1,800 [r]	1,131 [r]	1,200 [r]	1,300 [e]	1,200
Grand total:	288,000	288,000 [r]	280,000	280,000 [r]	304,000
Of which:					
Primary	272,000 [r]	272,000 [r]	265,000	268,000 [r]	298,000
Secondary	16,600	16,200	14,200	11,900	6,440
Undifferentiated	--	--	25 [r, e]	70 [r, e]	71 [4]

[e]Estimated. [p]Preliminary. [r]Revised. -- Zero.

[1]World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

[2]Whenever possible, total output has been separated into primary (from ores and concentrates) and secondary (tin metal recovered from old scrap). This table reflects metal production at the first measurable stage of metal output. Table includes data available through July 18, 2005.

[3]Exports.

[4]Reported figure.